



In Partial Fulfillment of the Requirements for the Degree of

## **Doctor of Philosophy**

### **Auriane Koster**

Will defend her prospectus

#### **Drivers of energy transitions: Where are we headed, why are we headed there, and how are we getting there**

Energy is a basic human need. It is also a central concern of sustainability because how we produce and consume energy affects society, economy, and the environment. Sustainability scientists are interested in energy transitions away from fossil fuels because fossil fuels are nonrenewable, increasingly expensive, have adverse health effects and, perhaps most importantly, may be the main driver of climate change. They see an opportunity for developing countries to avoid the negative consequences fossil-fuel-based energy systems, and also to increase resilience, by leap-frogging-over the centralized energy grid systems that dominate the developed world.

What is an “energy transition?” For the purposes of this research, I define an energy transition as a change in the balance between nonrenewable and renewable energy sources, such that renewables represent at least 51 percent of a country’s energy portfolio. Today, fossil fuels provide about 78 percent of the total global energy consumed, nuclear provides 3 percent, and renewable sources provide the remaining 19 percent (Renewable Energy Policy Network for the 21st Century).

I will start with a qualitative analysis of the relative influence of different institutional factors on energy transitions. I will identify and describe the actors, institutions, strategies, and intervention points that promote transitions. I will use Ostrom’s Institutional Analysis and Development (IAD) framework to determine how institutional factors have influenced choices about nonrenewable, nuclear, and renewable energy use.

Next, I will conduct an in-depth case study of Thailand’s transition to renewable energy sources to gather detailed empirical data. I will compare findings from the case study to my institutional analysis to see if the analysis is congruent with, and therefore relevant to, real- world energy transitions.

Finally, I will create a dynamic model to catalog and quantitatively analyze the influence of institutional factors on energy transitions.

My research will produce: 1) an in-depth case study of Thailand's progress in replacing nonrenewable energy sources with renewable energy sources; 2) a description of the institutional factors likely to promote a transition to renewable energy use; and 3) a model that will help countries determine the most sustainable energy investment mix for their circumstances. My research will contribute to our understanding of how energy transitions at different scales can be accomplished in developing countries. It will also help us better understand what it takes to make innovation spread in a society.

Friday, March 9, 2012  
12:30 pm  
Wrigley Hall, Room 201

Faculty, students, and the general public are invited.

Supervisory Committee:  
John (Marty) Anderies (Chair)  
Rimjhim Aggarwal  
Sander van der Leeuw